

## Pirates Cove Beach, Rye Water Quality Report Summer 2008



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#### **History of the Beach Program**

The New Hampshire Department of Environmental Services (DES) recognizes a public health threat may exist within recreational waters and tests the water at the state's beaches to ensure swimmers are not exposed to disease-causing pathogens or cyanobacteria scums. The DES has operated a Public Beach Inspection Program, commonly called the Beach Program, for over 20 years.

The New Hampshire coastal beach monitoring program was initiated in 1989 with the DES inspecting five beaches. In October 2000, the United States Congress amended the Clean Water Act to include the BEACH Act. The Environmental Protection Agency (EPA) could now was now authorized to award grants to eligible states to develop and implement monitoring and notification programs. These programs protect the public from exposure to pathogenic microorganisms in coastal recreation waters.

The DES first received grant funds in 2002. Since then the New Hampshire Beach Program has successfully met all of EPA's performance criteria requirements (National Beach Guidance and Required Performance Criteria for Grants) and continues to expand the monitoring and notification program. Weekly summer monitoring throughout the state was conducted at nine beaches in 2002, and has since doubled to 16 by 2008. The Beach program strives to expand sampling to include all coastal New Hampshire beaches.

Coastal beaches are monitored for the presence of the fecal bacteria Enterococci which are present in the intestines of warm-blooded animals including humans. Fecal bacteria, when present in high concentrations and ingested, can commonly cause gastrointestinal illnesses such as nausea, vomiting and diarrhea. These indicator organisms signify the possible presence of other potentially disease-causing organisms in the waterbody.

Beach monitoring and bacteria source tracking have been implemented to protect public health. In a collaborative effort, the DES Beach program, towns, beach managers, recreational directors and health inspectors encourage public awareness of sources of pollution and environmental responsibilities. Thank you for your interest and concern in New Hampshire's water quality.

#### **Beach Statistics**

Pirates Cove Beach is owned and maintained by the town of Rye. It is located on Route 1A in Rye. The beach season runs from June 1 to October 1. During the season, beach use is allowed between sunrise and midnight.

Pirates Cove Beach is a 3,110-foot long sandy beach. The beach is used by the public for swimming, walking, and general relaxing. There are two access points to the beach area from the parking lots (Figure 1). Lifeguards are present throughout the summer and portable toilet facilities are available.

Waterfowl are frequently observed at the beach; the most commonly observed are gulls and plovers. There is a town ordinance that restricts dogs from the beach during beach hours.

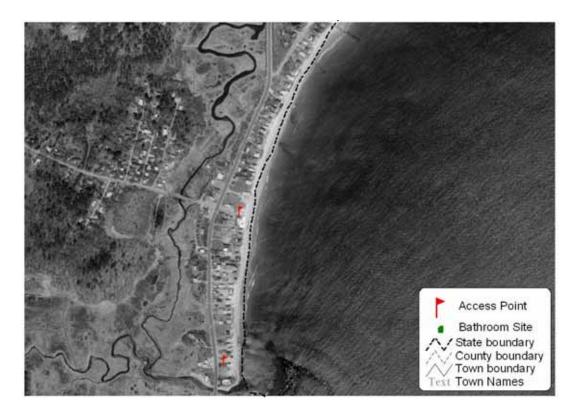


Figure 1. Pirates Cove Beach Access Points and Restroom Facilities.

#### **Assessing Your Beach**

#### **Sampling Frequency and Location**

The Beach Program developed a risk-based beach evaluation process and tiered monitoring approach during the 2003 beach season based on the EPA performance criteria. Beaches are evaluated annually to determine potential health threats to the public. Evaluations are based on several criteria within three main categories: beach history, microbial pathogen sources, and beach use. Beaches are now assessed as impaired for bacteria based on the most recent version of the Consolidated Assessment and Listing Methodology (CALM). The CALM assesses beach units as impaired based on historical exceedances of both the single sample and geometric mean bacteria standards. This report is submitted to EPA every two years.

Based on the evaluations, beaches are assigned a Tier I, Tier II, or Tier III status. Tier I beaches are considered "high priority" and have an increased potential to affect public health. Tier II beaches are "medium priority" and Tier III are "low priority" beaches that have less potential to affect public health. Beach sample frequency is based on Tier status; Tier I beaches are sampled twice per week, Tier II beaches are sampled once per week, and Tier III beaches are sampled every other week.

The number of samples collected at each beach is determined by the beach length. Beaches less than 100 feet in length are sampled at left and right locations one-third of the distance from either end of the beach. Beaches greater than 100 feet in length are bracketed into thirds and sampled at left, center and right locations. Routine sample collection may be enhanced by sampling known or suspected pollution sources to the beach area. Storm event sampling may be conducted at beaches where watershed runoff resulting from rainfall is expected to impact beach water quality.

Pirates Cove Beach is a Tier I beach indicating high priority, necessitating sampling twice each week. The frequency of sampling at the beach has changed since the launch of the beach evaluation process implemented in the 2003 sampling season. Pirates Cove Beach increased from being sampled once a week to being sampled twice a week in 2008 due to a CALM impairment.

At Pirates Cove Beach, samples are collected at the left, center, and right stations regularly (Table 1). All stations are evenly distributed along the shoreline (Figure 2) and can be accessed via the parking lots (Figure 1). Additional samples were also collected from Parson's Creek, located south of the beach area (Table 1).

Table 1. Pirates Cove Station Descriptions and Latitude/Longitude Points.

Station Description	Latitude	Longitude		
Left Sample Station: The sample is collected three houses south of the wall separating Wallis Sands and the northern end of Pirates Cove.	43° 1′ 35.0735"	-70° 43′ 45.4350"		
Center Sample Station: Park in the main parking lot for the beach off of Route 1A next to the Rye Surf Club. Walk straight to collect the sample.	43° 1' 18.1467"	-70° 43' 55.2550"		
Right Sample Station: Park at the access located across from Petey's Restaurant and immediately after a small bridge. Collect the sample in front of the sixth house north of the access lot.	43° 1' 6.8875"	-70° 43′ 57.2174"		
Parson's Creek Sample: Accessed from the parking area used for the right sample. Walk to the beach and turn south toward Parson's Creek.	42° 1' 0.0130"	-70° 43' 0.9740"		

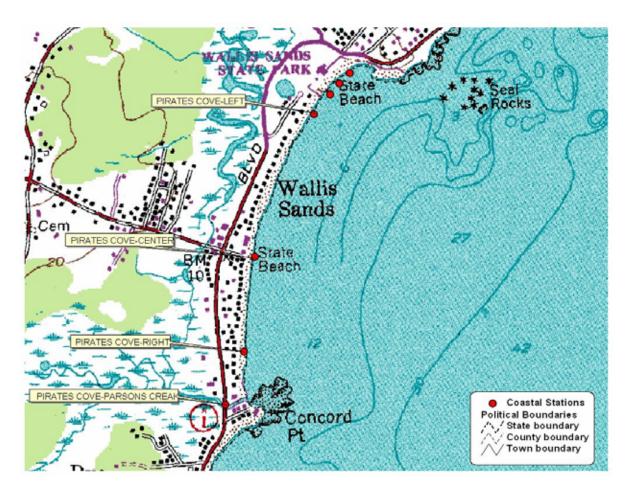


Figure 2. Pirates Cove Beach Monitoring Stations.

#### **Coastal Water Quality Standards and 2008 Results**

Beaches are monitored to ensure compliance with State water quality standards. Marine waters are analyzed for the presence of the fecal bacteria Enterococci. Enterococci are known as indicator organisms, meaning their presence may indicate the presence of other pathogenic organisms. The State standard for Enterococci at public beaches is 104 counts/100 mL water in one sample, or a geometric mean of 35 counts/100 mL in at least three samples collected over sixty days. When samples exceed the standard, a beach advisory is issued, at which point the beach manager is notified and signs are placed at the entrances to the beach to warn the public of the potential health threat posed by water contact at the beach. Beach advisories remain in effect until subsequent beach sampling indicates safe water quality conditions.

The 2008 sampling season began May 27th. The sampling season encompassed 96 days. Precipitation was recorded on 42 days over the summer (based on precipitation recorded at the Pease Air National Guard weather station). June wetfall totaled 5.79 inches while July and August yielded 8.86 and 2.6 inches of rain respectively.

At Pirates Cove Beach, 33 routine inspections were conducted in 2008. Ninety-nine samples were collected and tested for Enterococci (Appendix B). Overall, the 2008 summer Enterococci levels were moderate and usually within the State's standards for Pirates Cove (Figure 3), with one advisory issued.

The advisory at Pirates Cove Beach was posted due to samples taken on June 24. The Enterococci count at the right station was 480/100 mL. Parson's Creek, which discharges to the right end of the beach area, was sampled this day and also had a count of 480/100 mL. Over an inch and a half of rain had fallen in the 24 hours prior to sampling this day. Large amounts of wetfall can flush bacteria from the surrounding watershed into the beach area, elevating bacteria levels both in the ocean water and in tributaries such as Parson's Creek. Pirates Cove was re-sampled on June 26, and while results for Parson's Creek were still high, the samples taken from the beach area had decreased to a normal level.

Bacteria levels were elevated at the right sampling station again on July 21, with an Enterococci count of 140/100 mL. Neither the left nor center stations had high bacteria counts, so an advisory was not necessary. A single station must have a count of 170 Enterococci/100 mL or greater to require an advisory posting. As with the high results mentioned above, heavy rainfall (1.82 inches) in the 24 hours prior to sampling likely influenced bacteria levels at the beach. It should also be noted that the sample taken at Parson's Creek on the same day had an extremely high count of 890 Enterococci/100 mL, which indicates that the discharge from Parson's Creek affects the bacteria levels found at the right sampling station. Samples taken at Pirates Cove the next day were well within the State's standard, eliminating concern about the possibility of an advisory.

On July 30, Pirates Cove suffered another incidence of elevated bacteria levels. The center station had an Enterococci count of 110/100 mL. Neither of the other stations had a high count, so an advisory was not required. It is unclear what may have caused this uncharacteristic spike at the center station. Re-sampling showed that Enterococci counts were low and within the State's standards again by August 1.

#### Concerns

Parson's Creek is the major area of concern at Pirates Cove. The creek discharges to the right side of Pirates Cove Beach, frequently flushing bacteria-laden waters into the beach area. High bacteria levels measured at the right station of the beach were attributed to the influx of Parson's Creek bacteria load. A microbial source tracking study may be undertaken next summer to isolate the major bacteria sources that contribute to the high Enterococci counts measured in Parson's Creek.

#### **Future Projects**

- The DES Beach Program encourages participation between the town of Rye, local businesses, or school groups and the Adopt-a-Beach Program. The program promotes beach clean-ups and water quality monitoring. The DES would conduct training sessions and participate in education and outreach activities for the community.
- The town of Rye should consider restricting public access to the Parson's Creek discharge. Signs should be posted to indicate that this area may be unsafe for water contact due to potentially elevated bacteria. The DES can provide signs if town officials are interested.
- A pre-emptive rainfall advisory may be necessary at Pirates Cove Beach. An
  analysis of historical wetfall and bacteria data indicate a strong relationship
  between wetfall amounts and increased bacteria concentration. Beach advisories
  would be predicated based on determined bacteria levels measured from
  historical wetfall events. Study results will be discussed with the beach manager.

For more information on Adopt-a-Beach, beach signage, or pre-emptive advisories, please contact Sonya Carlson at (603) 271-0698 or <a href="mailto:sonya.carlson@des.nh.gov">sonya.carlson@des.nh.gov</a>.

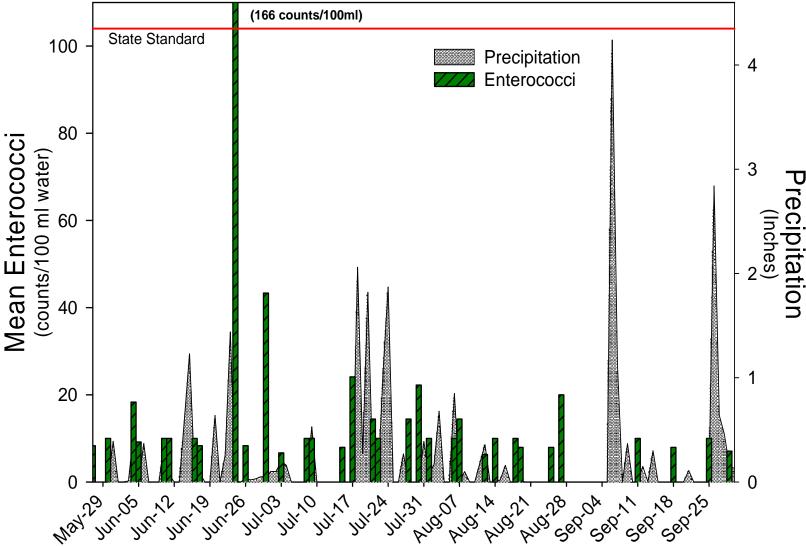


Figure 3. Pirates Cove Beach 2008 Enterococci Data. Enterococci values are the mean of tthree collected beach samples One advisory was posted at Pirates Cove Beach on June 24, 2008 as indicated by the bacteria value exceeding the state standard. The elevated September rainfall did not lead to increased bacteria values. See Appendix B for all results from all stations for the 2008 sampling season.

#### Appendix A: 2008 Special Report – Stormwater Modeling

When rain falls over the land, it flushes bacteria and other contaminants that have accumulated on the landscape to our beaches. As impervious areas like pavement and buildings are constructed in a subwatershed, more runoff contaminants are carried to our beaches. In addition to increased impervious cover as a result of land use changes, New Hampshire has recently experienced substantial and prolonged wetfall events. With increased flushing of the landscape combined with expanded impervious cover, it is imperative for local and state governments to explore new management techniques to protect New Hampshire beaches from contaminant sources.

DES Beach Program monitors New Hampshire coastal waters for potentially pathogenic bacteria. The DES has been monitoring these beaches since 1989 and has amassed large amounts of bacterial information for most coastal beaches. This collected information over the past years can be used to predict bacteria counts that can be expected with present and future development.

The DES Beach Program is proactive and always researching new management practices that can improve beach quality and new techniques to accelerate the beach advisory notification process. Beach Program personnel sample coastal beaches 4 days a week. Advisories are issued once state bacteria standards are exceeded. Despite our protective efforts, at least 24 hours pass from sample collection to bacteria count determination. During this time DES and swimmers are unaware of bacteria levels. The period of time between monitoring and sample analyses certainly put swimmers at risk for potential illness.

Two important Beach Program goals are to determine watershed contribution of bacteria to coastal beaches and to predict bacterial concentrations during and after a rain event. Mathematical models can be used to ascertain categories of bacteria sources and to predict bacteria concentrations after a rain event. Such models are complex and require a great deal of expertise and technical skill. The DES has selected FB Environmental to utilize an appropriate model and to train Beach Program personnel how to apply the model. With detailed predictions of how wetfall will affect bacteria transport to coastal beaches, future buildout planning, mediation, and construction could be guided by a stormwater model. The DES hopes the model will provide a useful tool for town officials and law makers to improve public notification and protect public health.

With the ability to predict public beach bacterial concentrations DES could immediately post an advisory based on predicted values and conduct follow up sampling for verification. A predictive model would allow advisories to be posted as soon as a public health threat occurs. Collecting samples during times of predicted high bacteria levels will help DES verify the accuracy and precision of the model. A model can be an effective tool in helping us achieve our mission to protect the public from exposure to waterborne illness while enjoying New Hampshire waters.

In addition to coastal bacteria data, the model will incorporate land use categories, hydrology, topography, historical precipitation records, historical tide data, and waste management. The data collection effort for this project has been time consuming and required help from several sources outside the DES. The DES would like to thank the National Oceanic and Atmospheric Association, the National Climatic Data Center, the Seabrook Nuclear Power Station and the Pease Air National Guard Base Weather Station for providing data. The model is only as good as the data we input, so we strive for the best quality controlled verified data available. The project is due for completion in early 2009.

### Appendix B: Pirates Cove Beach 2008 Data by Date

Date	Enterococci (count/100 mL)			Tide	Rainfall in	Number of	Animal Presence	
	Left	Center	Right	Parson's Creek	Height (feet)	previous 24 hours (inches)	bathers	Animal Presence
5/27/08	< 10	< 10	< 5	10	0.99	0	2	5 plovers
5/30/08	< 10	< 10	< 10		6.45	0	0	3 gulls, 10 plovers
6/4/08	10	10	50		7.08	0.23	0	30 gulls
6/5/08	< 10	< 10	10		7.9	0.22	0	0
6/10/08	10	10	< 10	10	1.46	0	2	0
6/11/08	< 10	< 10	< 10	220	1.51	0.44	9	10 gulls
6/16/08	< 10	< 10	10		8.13	0.01	0	20 ducks
6/17/08	< 10	< 5	< 10		8.41	0.04	1	0
6/24/08	< 10	< 10	480	480	1.08	1.53	17	0
6/26/08	< 10	< 5	< 10	120	3.1	0	0	10 gulls
6/30/08	90	< 10	30	50	5.24	0.08	10	0
7/3/08	< 10	< 5	< 10		8.25	0.10	50	0
7/8/08	< 10	< 10	< 5		2.1	0	47	0
7/9/08	< 10	< 10	< 10	120	0.92	0	35	0
7/15/08	< 10	< 5	< 10		7.58	0	11	3 gulls
7/17/08	< 10	< 10	< 10		7.85	0	24	0
7/21/08	10	< 10	140	890	3.03	1.82	10	0
7/22/08	10	< 10	30		5.74	0	25	0
7/28/08	< 10	10	10		2.91	0.20	31	0
7/30/08	< 10	110	30		8.63	0	27	0
8/1/08	< 10	< 10	10		7.78	0.10	17	15 gulls
8/6/08	10	< 10	10	150	3.25	0.35	0	35 gulls, 15 plovers
8/7/08	< 5	< 10	10		1.18	0.50	4	40 gulls
8/12/08	10	5	30		7.27	0.45	0	10 gulls
8/14/08	< 10	< 10	< 10		7.91	0	24	0
8/18/08	< 5	< 10	< 10		5.74	0	28	0
8/19/08	< 10	< 10	< 10		7.61	0.01	2	12 gulls
8/25/08	< 10	< 5	< 10		1.33	0	4	20 gulls
8/27/08	< 10	< 5	< 10		7.25	0	5	0
9/11/08	< 10	< 10	160		5.27	0	0	0
9/18/08	< 10	< 10	< 10		5.34	0	0	9 gulls
9/25/08	< 10	< 10	5		1.44	0	0	1 gull
9/29/08	< 10	5	< 10		9.26	0.31	2	1 gull